



Explosion Welding for Hermetic Containerization

There is no need to decontaminate the outside of the container.

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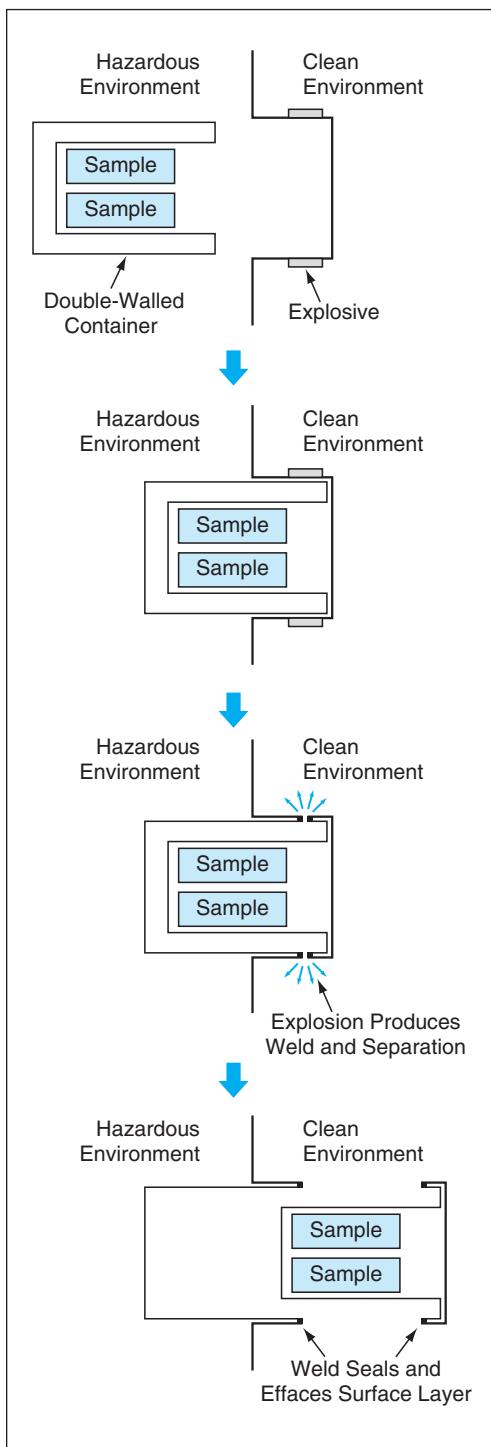


Figure 1. The **Explosion Seals the Samples** in the container while simultaneously excluding previous exterior container contamination from the clean environment.

A container designed for storing samples of hazardous material features a double wall, part of which is sacrificed during an explosion-welding process in which the container is sealed and transferred to a clean environment. The major advantage of this container sealing process is that once the samples have been sealed inside, the outer wall of what remains of the container is a clean surface that has not come into contact with the environment from which the samples were taken. Thus, there is no need to devise a decontamination process capable of mitigating all hazards that might be posed by unanticipated radioactive, chemical, and/or biological contamination of the outside of the container. The container sealing method was originally intended to be used to return samples from Mars to Earth, but it could also be used to store samples of hazardous materials, without the need to decontaminate its outer surface.

Figure 1 depicts the process stages. In its initial double-wall form, the volume between the walls is isolated from the environment; in other words, the outer wall (which is later sacrificed) initially serves to protect the inner container from contamination. The sample is placed inside the container through an opening at one end, then the container is placed into a transfer dock/lid. The surfaces that will be welded together under the explosive have been coated with a soft metallic sacrificial layer (see Figure 2). During the explosion, the sacrificial layer is ejected, and the container walls are welded together, creating a strong metallic seal. The inner container is released during the same event and enters the clean environment.

This work was done by Benjamin Dolgin and Joseph Sanok of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

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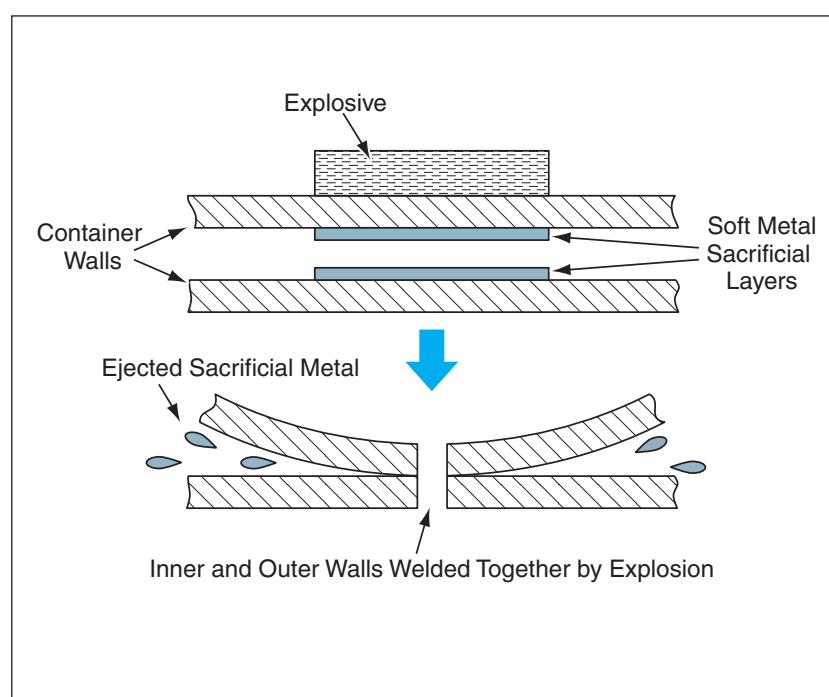


Figure 2. **Sacrificial Metal** is squeezed out, the container walls are cut, and the container walls are welded together on both sides of the cut.